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ABSTRACT

This field guide gives pictures and descriptions of plants that can be found along the San Francisco Bayshore, especially along the Hayward shoreline. The plants are divided into three categories, those of the mud-flat zone, the drier zone, and the levee zone. Eighteen plants are represented in all. The guide is designed to be used alone, with an audio tape, or with a tape and filmstrip. In addition to the plant descriptions, it gives background information and tips for locating plants. (BB)

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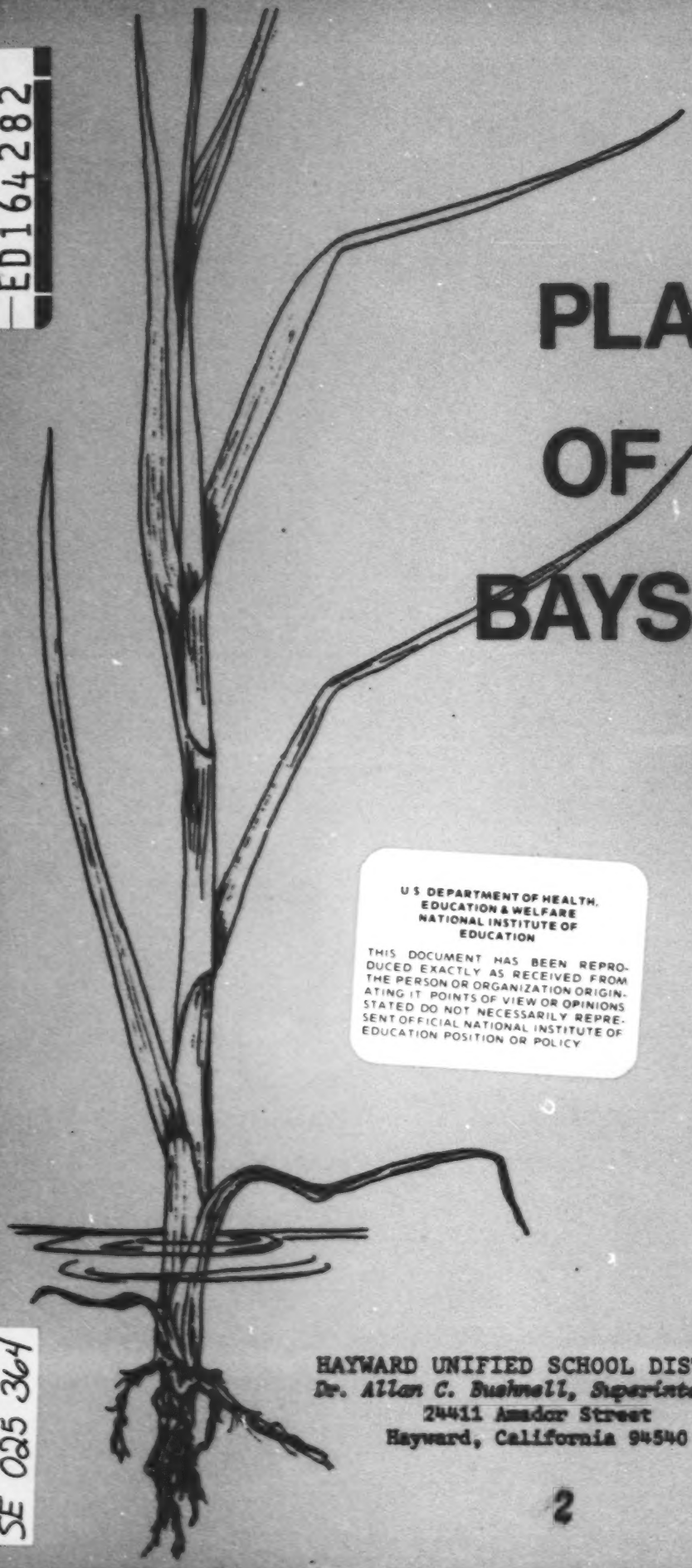

PLANTS OF THE BAYSHORE

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HAYWARD UNIFIED SCHOOL DISTRICT
24411 Amador Street
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June 1, 1978

PLANTS OF THE BAYSHORE

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A BIT OF BACKGROUND...

It is mid-summer. You stand atop a levee enjoying the pungent fragrance of radish and mustard. As you watch, the incoming bay tide laps gently at a luxuriant stand of cordgrass. A dozen white pelicans soar overhead, their huge wings making a gentle whooshing sound as they head for a nearby salt pond. In the distance, gulls chatter noisily and a group of sandpipers walk-walk-walk, poke-poke-poke along the mudflats in search of food.

This is the Hayward Shoreline - eight miles of San Francisco Bay frontage, bordered by the San Francisco Bay National Wildlife Refuge (Fremont) on the south, and by the city of San Leandro on the north. It is an area that many of the residents of Hayward have not yet seen. In fact, until the last several years, most of our citizens were unaware that the richly diverse Hayward Shoreline exists.

Some 20,000 acres of mud flats, marshes, salt ponds, and grassy fields make up this hidden, and often forgotten, area. For the past 40 years the land has been under the control of private parties. It has been accessible to only a few - bird watchers, duck hunters, salt and scavenger companies. Now community members have the opportunity to see and enjoy this peaceful, quiet wonderland which is only minutes from the hubbub of their daily activities.

Making the Shoreline available to the general public has taken much time and effort on the part of citizens in the Hayward area. The Hayward Area Shoreline Planning Agency (HASPA), formed in 1971, coordinated a three-year study of the Shoreline environment. Economic conditions which affect future land uses and the need for recreation facilities were considered. Plans were made and are now being implemented to preserve and maintain the Shoreline for ecological, educational, and recreational purposes.

The need for such planning becomes all too clear when one realizes that in 1850 - before the diking and filling of the Bay began - the total area of San Francisco Bay was nearly 680 square miles. Today only 435 square miles remain. Were this trend to continued unchecked, most of the wet lands of the South Bay could be lost within the next ten years. Lost, also, would be the millions of creatures whose very existence depends wholly or in part upon this area. And for the human residents of the Bay Area, such a loss would end countless opportunities to share an intimate adventure with nature.

BEFORE YOU BEGIN - SOME RULES AND REMINDERS

PUBLIC OR PRIVATE?

At the present time, much of the Hayward Shoreline has been acquired by member agencies of HASPA, and the long-term plans for the area are being put into operation. Meanwhile, access to the Shoreline is limited. Educational training and study trips are being made available to members of the community so that as the Shoreline becomes publicly accessible, its care and use will be understood. Community workshops are being offered under the auspices of the Hayward Area Shoreline Environmental Education Project. Citizens interested in participating in the program may contact Project Coordinator Leo Bachle through the Hayward Unified School District.

RELICS OR RUBBLE?

You will find both on the Hayward Shoreline. Much of what man has built and discarded, dumped and forgotten in past years, remains today. Weather and the unrelenting Bay tides have taken their toll on the old landings, windmills and the boat houses. Now they are picturesque memories for the painter or photographer to capture and take home. Smaller remnants of man's Bayside occupancy wash up on tidal mud flats - some unsightly, some enticing to the would-be collector. But to preserve the distinctive character of the Hayward Shoreline, visitors are asked to leave both relics and rubble undisturbed.

ENJOY OR ENDANGER?

As we begin to understand the fragile nature of the Hayward Shoreline, we will be more likely to enjoy its nuances and less likely to endanger its delicate balance. Each feather, each shell, each wildflower seems a tempting keepsake to the uninformed visitor. But every time such a treasure is removed from its natural setting, a part of the Shoreline is diminished, and nature's balance is upset. The massive effort to save the Hayward Shoreline is being made to protect and preserve the area - protection for the millions of creatures who inhabit it year-round, and preservation for the many human and nonhuman visitors who will use it in the future.

THREE WAYS TO USE THIS GUIDE: ALONE, WITH TAPE, WITH FILMSTRIP

So that you can learn about the plants of the bayshore in a way which most suits your needs, we have prepared this Guide in conjunction with a filmstrip and a tape recording. The text + tape + filmstrip make a complete system for your use.

USING THE GUIDE ALONE

The Field Guide will help you identify plants you might see as you walk along the shoreline of a bay or estuary. It may be used as a "first-time" reference or as a follow-up to a more extensive plant study made prior to your shoreline visit.

USING THE GUIDE WITH THE TAPE RECORDING

The tape describes and discusses the plants found on the bayshore and make an ideal "walking companion" on a shoreline visit. (You will need a small portable, battery-operated cassette tape recorder/player.) The descriptions on the tape exactly match the first 43 illustrations in the Field Guide. A tone (beep) on the tape is the signal to look at the next picture.

We suggest that you find the plant using the text illustration, listen to the description on the tape, and when the tone sounds again, TURN OFF THE TAPE. Find the next plant pictured and, then, turn on the tape to hear that plant described. This method will give you the full benefit of the text plus illustration, taped description, and the plant, itself.

USING THE GUIDE WITH THE FILMSTRIP

For indoor study and/or orientation to the plants, the first 43 illustrations in the filmstrip and the text and the first 43 descriptions on the tape are keyed to match. Thus, in viewing the filmstrip, the descriptive text material in the Guide or the tape recording may be used as the accompanying narrative. (In addition to the "beep" the tape has a signal which will automatically advance the filmstrip if your projector is so designed. If not, the film should be advanced manually at the sound of the tone.)

For teachers, youth leaders, and organized community groups, we recommend that the filmstrip and tape recording be presented first, and that the Guide be used for follow-up, as well as for reference, as you visit the shoreline.

All three parts of this Plants of the Bayshore "system" - the Guide, the tape recording and the filmstrip - are available from the following sources:

City of Hayward
East Bay Regional Park District
Hayward Recreation & Park District
Hayward Unified School District
San Lorenzo Unified School District

WHERE TO GO AND WHAT TO EXPECT ON THE HAYWARD SHORELINE

The watery, salty, apparently hostile world of the shoreline seems an unlikely environment in which to find delicately blooming or sweet-scented plants. Yet such plants do exist among the great variety of vegetation which thrives along the shores of our bays and estuaries.

Along the Hayward Shoreline, three distinct plant zones can be found:

ZONE 1 - The Mud Flat Zone is the area in which plant roots live submerged in water (low tide zone) and tolerate 6% salt water.

ZONE 2 - The Drier Zone is the area in which plant roots live in the drier portion of the marsh (high tide zone) and tolerate 2% to 6% salt water.

ZONE 3 - The Levee Zone is the area that contains introduced plants which tolerate no salt water and depend upon rainfall for moisture (flood zone).

The plants found in Zones 1 and 2 are well-adapted to live in salty soil and are called *halophytes* (salty life).

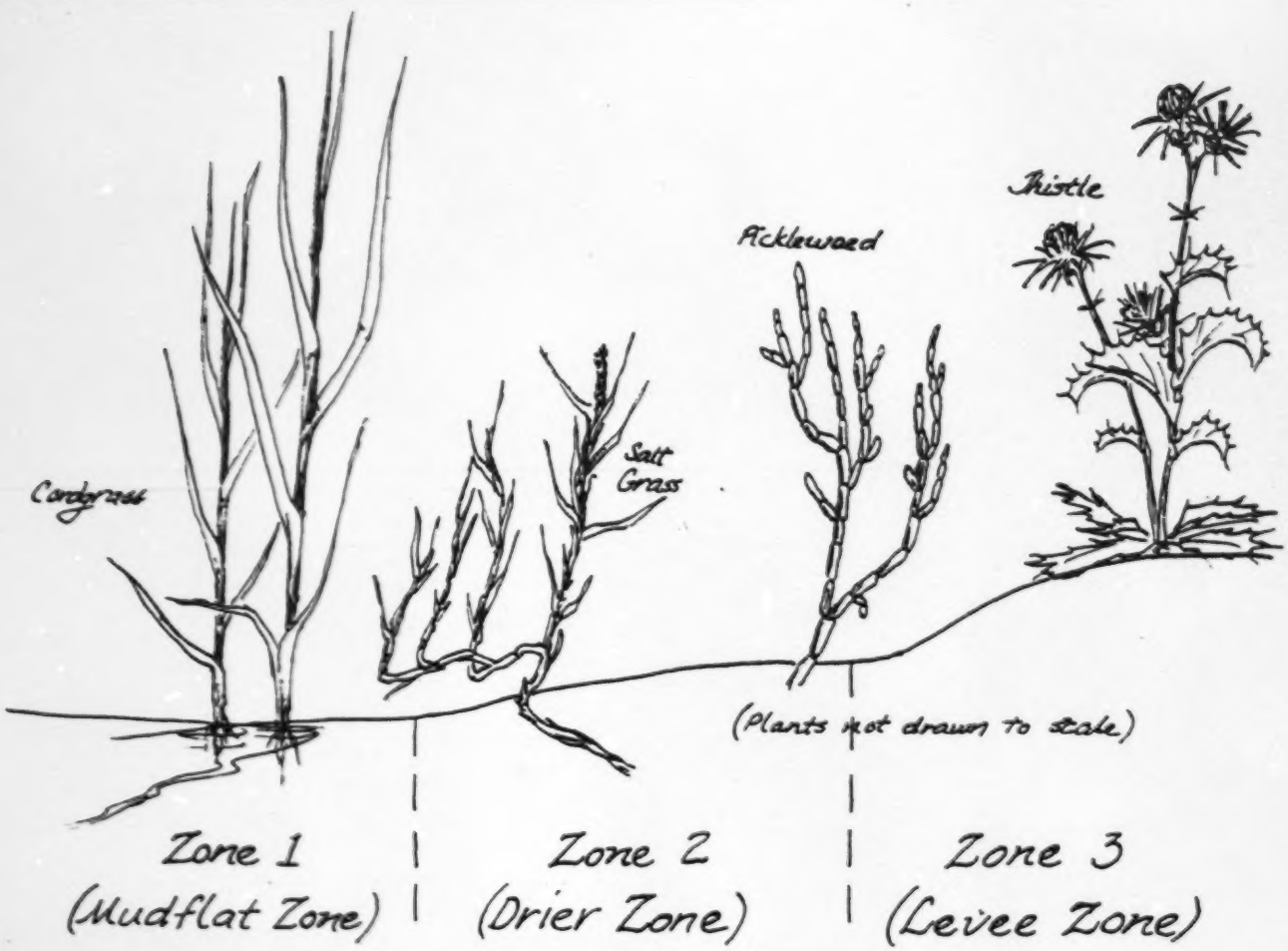
Zone 3 plants are not typical marsh plants and have been introduced to the area by wind and birds. The soil on the levees is not salty and, as one might expect, many of the species growing there can also be found in fields and on hillsides throughout the Bay Area. We have included only the most commonly seen flowering plants in this category.

Since precise living conditions determine the location of plant types, shoreline plants do differ from site to site. Changing conditions can (and do) drastically change the plant community at a given site. The bayshore plant most common to all sites along the Hayward Shoreline is pickleweed, with cordgrass and salt grass next in abundance. All three of these plants can be found at Haywards Landing which is an easily accessible, undisturbed marsh and lends itself as a study location.

By contrast to other bayshore sites, Turk Island, lying at the southern end of the Hayward Shoreline, is untouched by even the highest tides. This hilly grassland is 100 feet high and its plants are solely dependent upon winter and spring rains for moisture. Many plants are found here that are seldom seen along other parts of the shoreline. On Turk Island one may find brodiaea, wild oats, dock, California poppy, and even poison oak!

This Guide was designed to give an overview of plants in a typical bayshore environment. It will be most helpful when used at a site such as Haywards Landing.

PLANT ZONES ON THE SHORELINE



A. ZONE 1: The area that contains plants whose roots live submerged in salt water (low tide zone) and tolerate 6% salt.

B. ZONE 2: The area that contains whose roots live in the drier portion of the marsh (high tide zone) and tolerate 2% - 6% salt water.

C. ZONE 3: The area that contains introduced plants which tolerate no salt water and depend upon rainfall for moisture (flood zone).

PLANNING YOUR SHORELINE VISIT - A LIST OF PLANTS AND THEIR SEASONAL CHANGES

Perhaps one of the most intriguing qualities of the Hayward Shoreline is its constant change. Subtly, dramatically, from season to season, day to day, and even hour to hour, changes await the visitor who takes the time to listen and to look.

In the pages which follow, most of the plant illustrations show plants in flower. The season during which the boom occurs is clearly indicated both in the text and on the tape. So that you may get the fullest enjoyment from your shoreline visits, no matter what the season, the year-long description/census below will be helpful.

SEASONAL CHANGES OF SHORELINE PLANTS

Numbers indicate which month(s) of the year dormancy, leaf, flower or seed usually occurs. An "N" under dormant means "never." For more information on zones, see page

		Dormant	Leaf	Flower	Seed	Zone
1.	CORDGRASS *(Spartina foliosa)*	1-3	4-10	11	12	1
2.	PICKLEWEED *(Salicornia virginica)* (Red stage in winter; green stage in spring/summer)	N	all	7-8	7-8	2
3.	SALT GRASS *(Distichlis spicata)*	N	all	4	6-7	2
4.	MARSH DODDER *(Cuscuta salina)*	12-2	None	4-6	4-6	2
5.	MARSH GRINDELIA *(Grindelia humilis)*	N	all	all	all	2
6.	ALKALI HEATH *(Frankenia grandifolia)*	N	all	5-6	6	2
7.	BLITE	11-3	4-5	5-7	5-7	2
8.	FAT HEN *(Atriplex patula)* (Rust-red in winter months)	11-2	3-5	6-7	8	2
9.	BRASS BUTTONS *(Cotula coronopifolia)*	N	all	3	4	2
10.	NEW ZEALAND SPINACH *(Tetragonia expansa)*	N	all	6	7	2
11.	AFRICAN ICE PLANT *(Mesembryanthemum nodiflorum)*	N	all	6	7	2
12.	AFRICAN ICE PLANT *(Mesembryanthemum crystallinum)*	N	all	6	7	2
13.	MUSTARD *(Brassica spp.)*	N	all	all	all	3
14.	RADISH *(Raphanus sativus)*	N	all	all	all	3
15.	COYOTE BUSH *(Baccharis pilularis)*	N	all	10	11	3
16.	OXALIS *(Oxalis spp.)*	6-9	all	2-5	2-5	3
17.	SWEET ALYSSUM *(Lobularia maritima)*	N	all	2-5	3-6	3
18.	THISTLE *(Cirsium coulteri)*	10-2	3-9	4-7	8-9	3

NOTE: This data is based on a study made during 1975-77, which were years of extremely limited rainfall in California. The study is on-going and up-dated information will be provided as it becomes available.

LIST OF PLANT ILLUSTRATIONS

Plants of the Mud Flat Zone

1. CORDGRASS
   a. Overview
   b. Site Location
   c. Tassels/Flowers
   c. Salt Crystals

Plants of the Drier Zone

2. PICKLEWEED
   a. Green Stage
   b. Red Stage
   c. Flower

3. SALT GRASS
   a. Site Location
   b. Tassel
   c. Runners

4. MARSH DODDER
   a. Site Location
   b. Tentacle
   c. Flower

5. MARSH GRINDELIA
   a. Site Location
   b. Bud
   c. Flower

6. ALKALI HEATH
   a. Site Location
   b. Flower
   c. Leaf

7. BLITE
   a. Site Location
   b. Flower and Seeds
   c. Dried twig and Seeds

8. FAT HEN
   a. Site Location in Spring
   b. Flower
   c. Site Location in Fall

9. BRASS BUTTONS
   a. Site Location
   b. Flower

10. NEW ZEALAND SPINACH
    a. Site Location

11. AFRICAN ICE PLANT
    a. Site Location
    b. Flower

12. AFRICAN ICE PLANT
    (another species)
    a. Flower

Plants of the Levee Zone

13. MUSTARD
    a. Site Location
    b. Flower

14. RADISH
    a. Site Location
    b. Flower

15. COYOTE BUSH
    a. Site Location
    b. Flower

16. OXALIS
    a. Site Location
    b. Flower

17. SWEET ALYSSUM
    a. Site Location
    b. Flower

18. THISTLE
    a. Site Location
    b. Flower

There was a time when stands of cordgrass like that pictured below were a common sight along the tidal mudflats of our bays and estuaries. As technological man has usurped the shorelines for his own purposes, cordgrass-dominated salt marshes have rapidly disappeared.

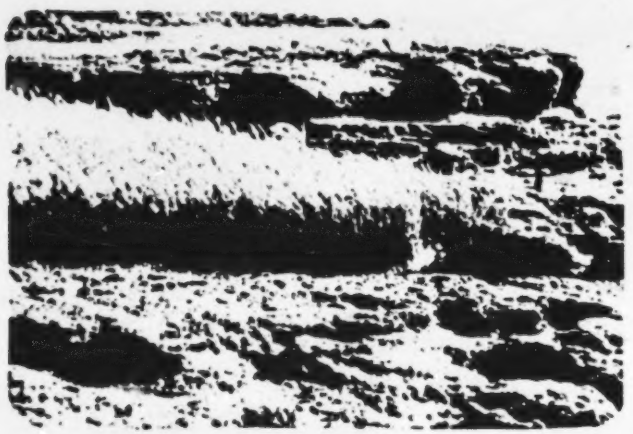
Efforts are now being made to save remaining salt marsh habitats and to encourage the growth of cordgrass in areas where it has disappeared. This time-consuming task seems well worth the effort when one realizes that cordgrass is the single most important plant of the shoreline.

Cordgrass outproduces corn or wheat in tons per acre. Its golden-tassled flower feeds the rare salt marsh song sparrow and the endangered clapper rail. Bay mussels live in its rootballs, and in the winter, when the cordgrass dies, it decomposes to provide food for millions of microorganisms which live in bay waters and mud. Cordgrass is a basic link in the complex eco-system that binds all of the fish, birds, and mammals which live and feed along the shoreline.

Frame 1
#1a CORDGRASS: Plant

Cordgrass

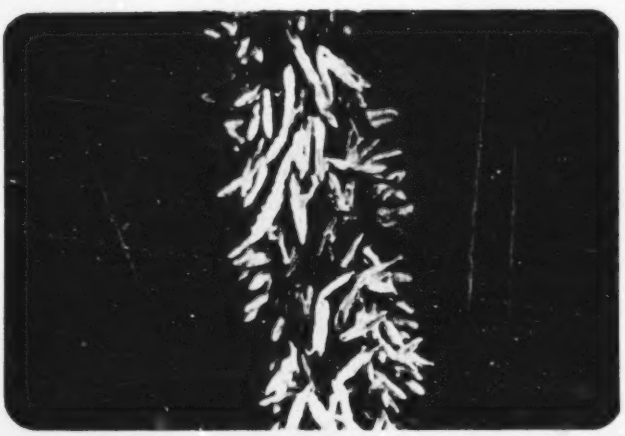
PLANTS OF THE MUDFLAT ZONE



Frame 2
#1b CORDGRASS: Site Location

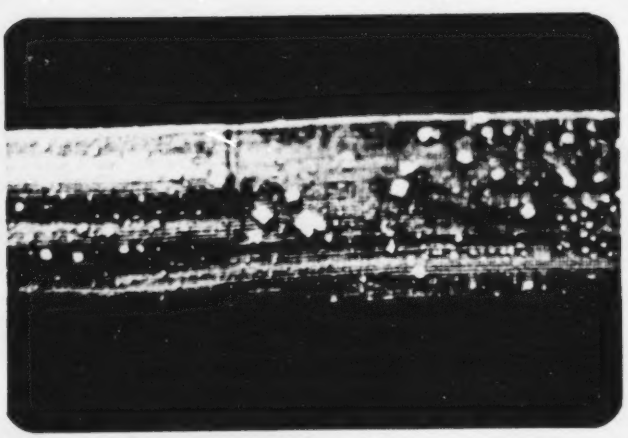
1. CORDGRASS *(Spartina foliosa)*

Cordgrass is the major producer in the food chain. Shown is a dense patch at low tide. Separately, it resembles a corn plant. Together plants look like those in a rice paddy. These plants were about one foot tall when this picture was taken and will reach heights of three to four feet. Spreading is done by runners from the base of each plant. Cordgrass can endure 21 continuous hours of salt water submergence. It is accessable only at low tides.



Frame 3
#1c CORDGRASS: Tassels/Flowers

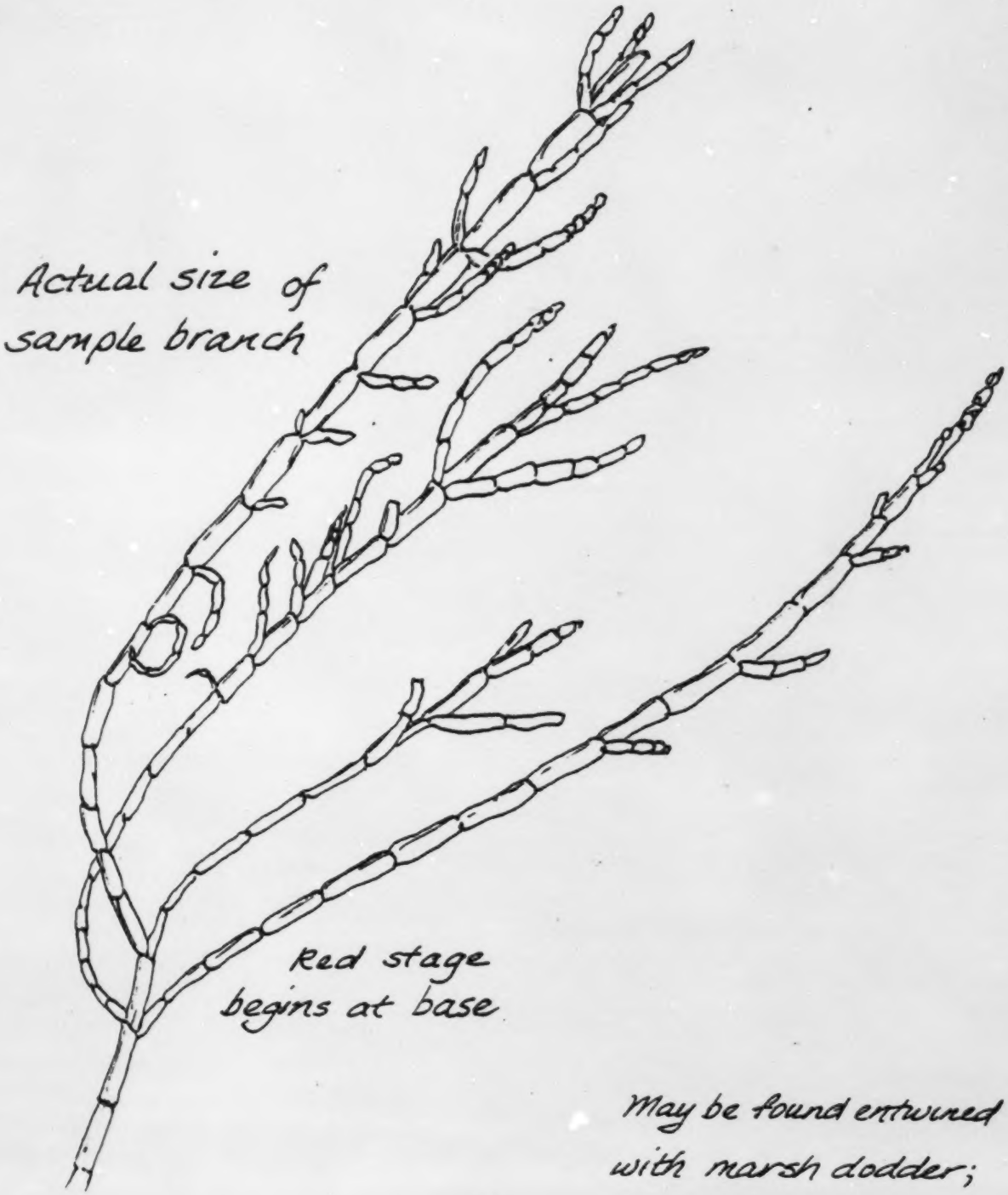
Shown is a portion of a flowering cordgrass tassel approximately six inches long. The tiny flower looks similar to barley and, indeed, cordgrass is a member of the barley family. Perhaps Indian residents of long ago used the cordgrass seed much as we use barley today. Find and examine closely a flower which has ripened and begun to explode its seed. Flowers appear mid-October through November.



Frame 4
#1d CORDGRASS: Salt Crystals

This remarkable photograph shows a truly unique phenomenon. Cordgrass roots absorb salt water and the leaf blades expel salt crystals. Imagine that! A plant with its own water purification system! Locate salt crystals on a leaf blade and taste one. These shown are about the size of a pinhead.

Pickleweed



May be found entwined with marsh dodder; see page 16.

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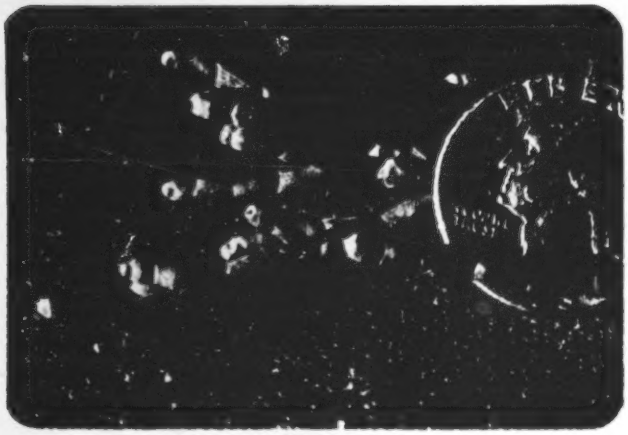
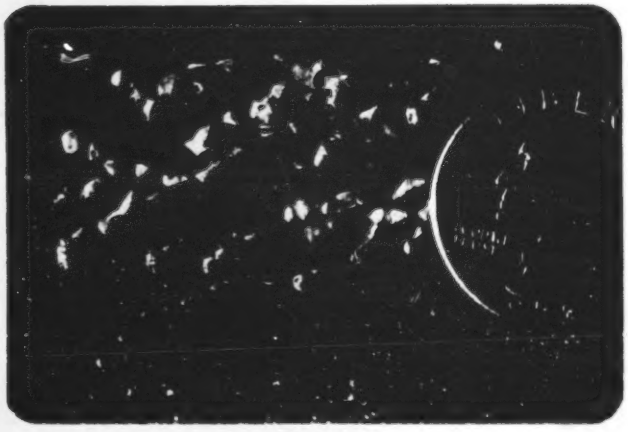


Frame 5
#2a PICKLEWEED: Green Stage

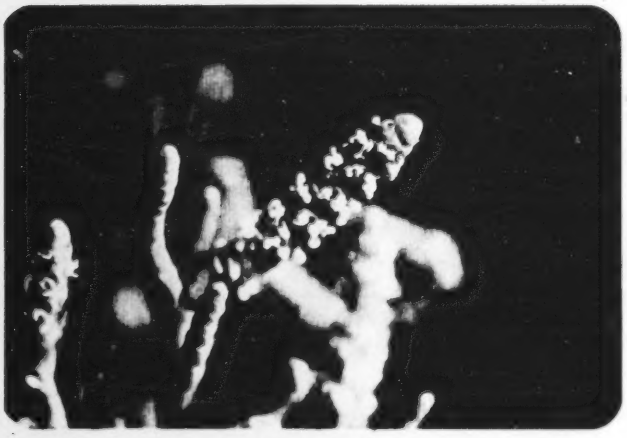
2. PICKLEWEED *(Salicornia virginica)*

Shown next to a quarter (for scale), the "bracts" or "pickles" look like links in a chain. In this stage the branch contains salty juices. Break off a piece and taste it! Pickleweed can be used as a spicy addition to salads. Leaves are in the form of scales to prevent water loss. Varieties of pickleweed are found throughout the coastal marshes of the United States.



Frame 6
#2b PICKLEWEED: Red Stage

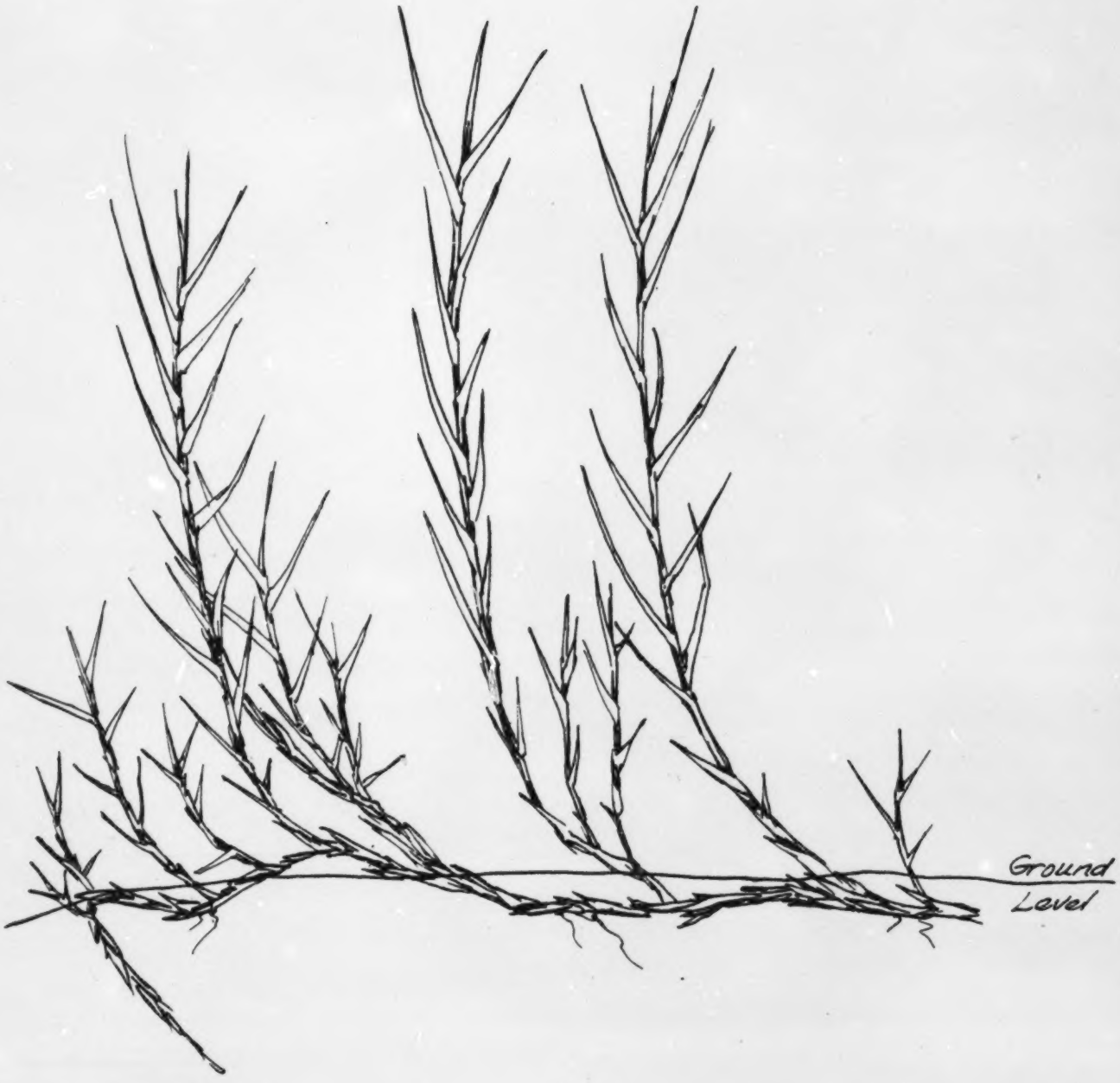
Shown again next to a quarter, the pickleweed bracts are now red. This is due to the ability of pickleweed to absorb salt water, but its inability to dispose of the salt. Taste a red bud and see if you taste more salt concentration than in a green bud. This concentration of unexpelled salt turns the bracts from green to red. Eventually, the bracts dry up from the salt buildup and drop off.



Frame 7
#2c PICKLEWEED: Flower

In July, pickleweed begins to flower, exploding along the bracts with tiny white blossoms each the size of a pinhead. Use a hand lens to see the separate parts of a flower. Soon the seeds will be formed. In order for the seeds to germinate, they must be watered by rain. In the spring, new pickleweed shoots will sprout along the high tide zone.

Salt Grass



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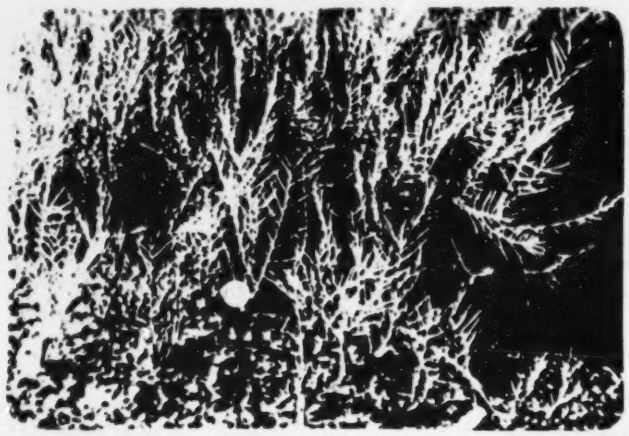
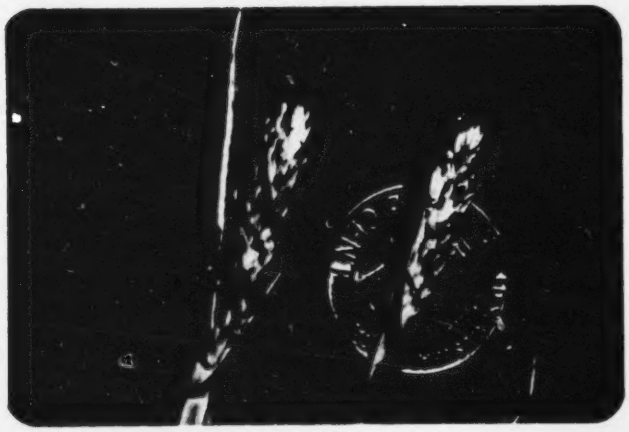


Frame 8
#3a SALT GRASS: Site Location

3. SALT GRASS *(Distichlis spicata)*

Salt grass shown here is about ten inches high (quarter shows scale). Salt grass resembles bermuda grass. It grows in dense mats and spreads by runners. It is usually found growing higher up on the high tide zone, above the pickleweed. This species also grows in true desert communities such as Death Valley, California. What do you think an estuarian marsh and a desert have in common that would cause both to support the growth of salt grass?



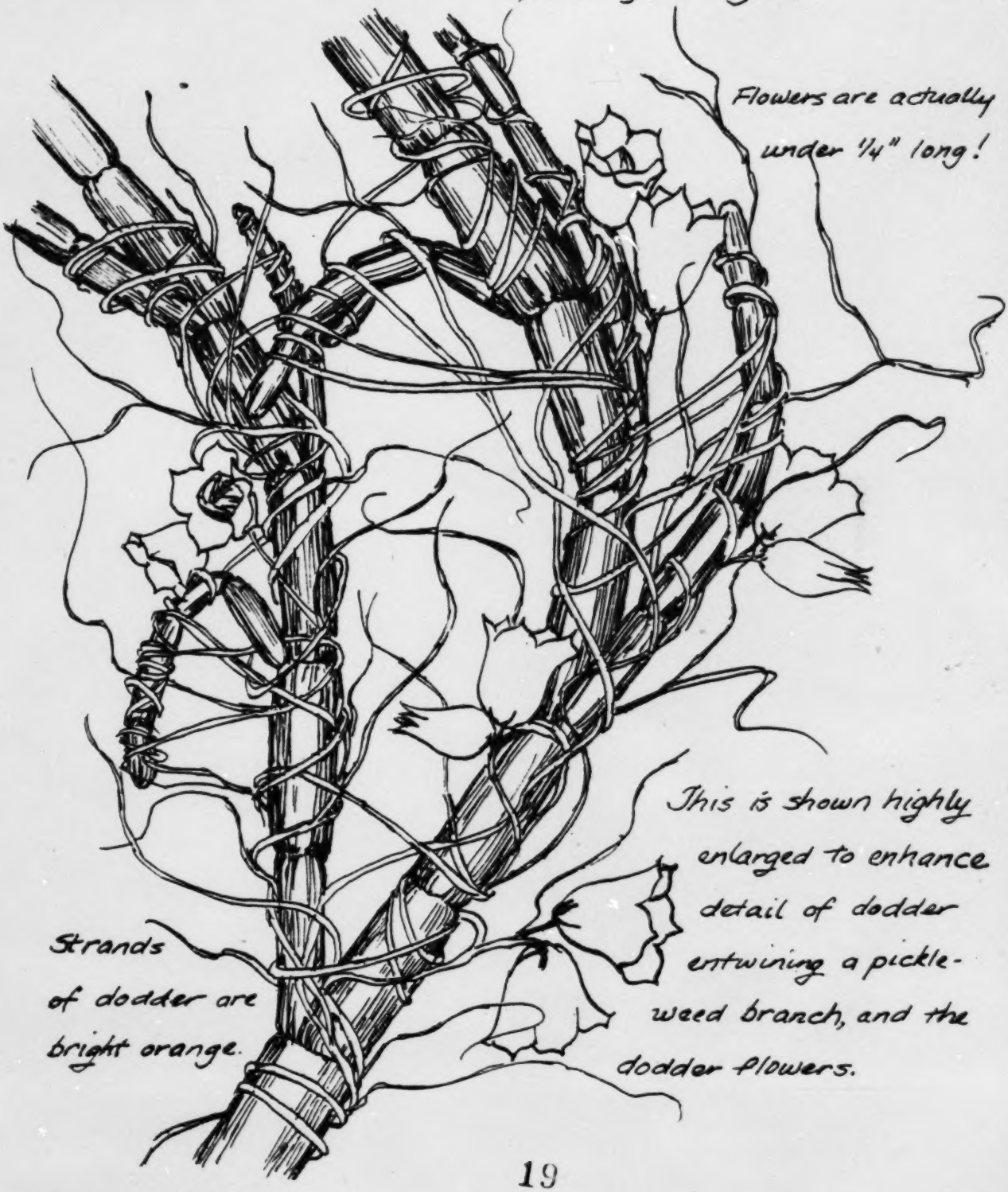
Frame 9
#3b SALT GRASS: Tassel

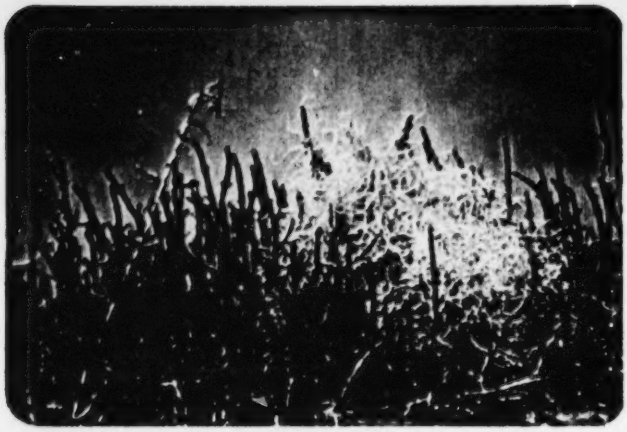
The salt grass tassel grows to about three inches long. A member of the grass family, its tassel contains many flowers, each of which becomes a seed. Locate a tassel and remove a flower. Notice that there are no brightly colored petals. What type of animal do you think eats it?

Frame 10
#3c SALT GRASS: Runners

Salt grass runners help to keep shoreline mud banks from eroding. Here, the salty soil was partly dug away to show the plant's massive underground root system. Broken pieces of colored glass in the background are evidence that this was a former dumpsite. Trace a salt grass runner and see how far it leads you!

Marsh Dodder


(Greatly enlarged)
Flowers are actually under 1/4" long!
This is shown highly enlarged to enhance detail of dodder entwining a pickle-weed branch, and the dodder flowers.
Strands of dodder are bright orange.



Frame 11
#4a MARSH DODDER: Site Location

4. MARSH DODDER *(Cuscuta salina)*

Marsh dodder, thick orange hair-like strands, grows on green pickleweed. Dodder feels like the silk on an ear of corn. It weaves around the pickleweed, sending in roots to absorb pickleweed juices. Seeds germinate to form free-living green plants which then attach to pickleweed to renew the life cycle. Dodder is a member of the morning glory family.

Frame 12
#4b MARSH DODDER: Tentacle

Shown is a tentacle of dodder growing on pickleweed. Though dodder is dependent upon pickleweed, it is not known whether pickleweed benefits from dodder's intrusion. Certainly, the pickleweed seems to thrive with or without the colorful dodder. Use a hand lens to see dodder's roots entering the pickleweed. Try to unravel a dodder strand and watch as it springs back into a coil.

Frame 13
#4c MARSH DODDER: Flower

The five-petal white flower of dodder is truly small, as you can see by the penny faintly visible in the background. Use a hand lens when you look at this delicate creation. The green seed in the middle is about the size of a pinhead. Dodder flowers appear in April, May and June.

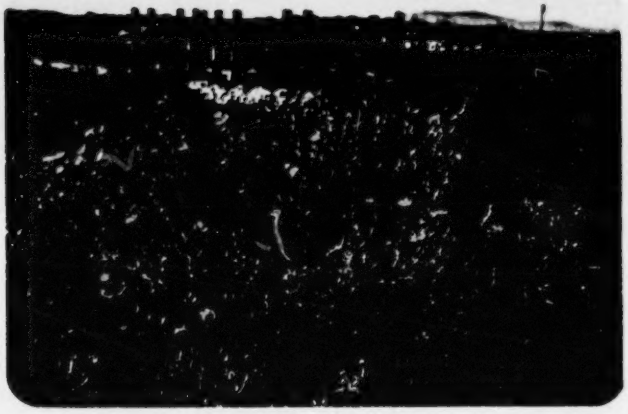
Marsh Grindelia

Bright yellow flower similar to daisy

Sticky buds

Leaves get larger toward ground

Grows to three feet tall



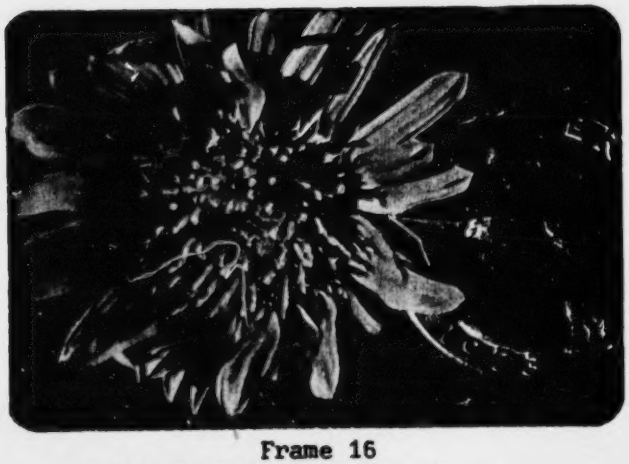
Frame 14
#51 MARSH GRINDELIA: Site Location

5. MARSH GRINDELIA *(Grindelia humilis)*

Shown here is the yellow "wildflower" of the shoreline, grindelia, or "gum plant." This plant is about four feet tall. It is a succulent and blooms year round. At extremely high tides its flowers are the only part visible. Look for this plant surrounded by dense mats of pickleweed, as seen in this picture.

Frame 15
#5b MARSH GRINDELIA: Bud

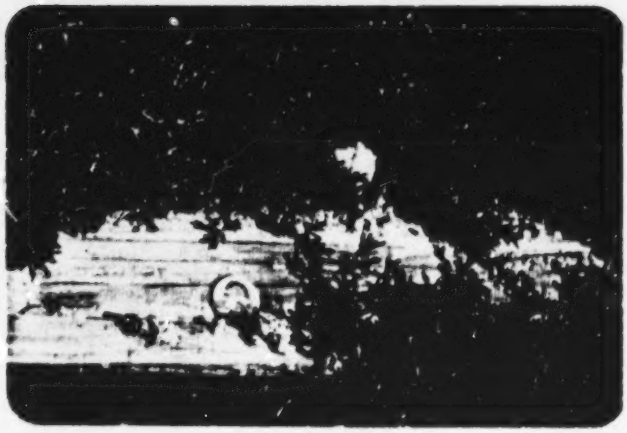
Shown here is a grindelia bud. Notice its white pasty appearance, hence the name "gum plant." The two ants walked helplessly onto its sticky surface to be forever trapped. Grindelia releases its resin to guard against dehydration. If you locate a bud, touch the resin and squeeze it between your fingers.



Frame 16
#5c MARSH GRINDELIA: Flower

Here you see the grindelia bloom - the "wildflower" of the shoreline. Resembling a sunflower, it blooms all year round. The petals are thin and can be easily plucked for close observation with a hand lens. One favorite visitor to this flower is a small bee that does the pollination. If you see him there first, let him finish his business, as he is doing an important job!

Alkali Heath



Frame 17
#6a ALKALI HEATH: Site Location

6. ALKALI HEATH *(Frankenia grandifolia)*

Alkali heath is a low-growing bush, here seen creeping over a forgotten plank. It is a succulent and thrives after rains. One must look closely at the heath to discover its beautiful tiny flower (above the quarter). This picture was taken during the fall months when the plant begins to turn a rust color as evidenced by some of its lower branches.

Frame 18
#6b ALKALI HEATH: Flower

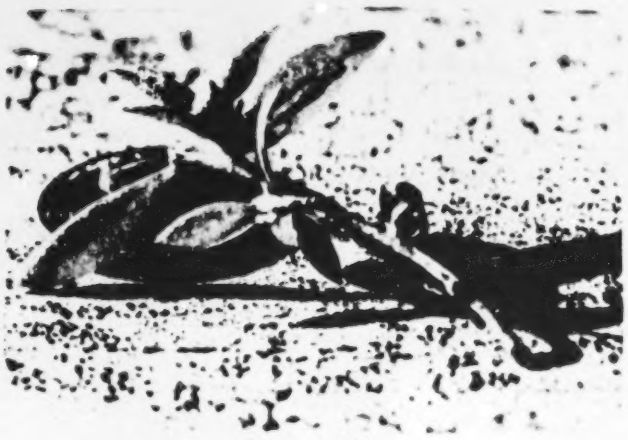
This is a greatly enlarged picture of the purple heath flower resting on a penny. Its five petals are shaped like a star. A handlens will help you see the detail of this tiniest of native marsh flowers. The camera buff will need close-up lenses to capture this prize! Look for the flower in spring or summer months.

Frame 19
#6c ALKALI HEATH: Leaf

Leaves of the heath are short and narrow and grow in groups. This picture was taken in the winter before its flowers appear. After heavy rains, as in this photo, small branches will appear emerging from the marsh. The leaves are very thick and are waxy to protect against water loss. Pick a leaf and break it open to release the stored moisture.

24

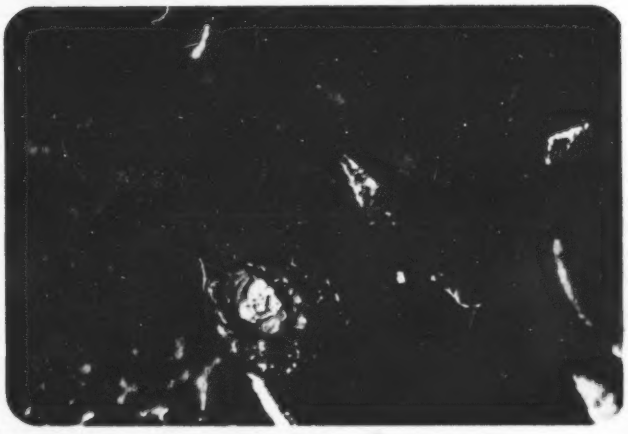
Blite



Frame 20
#7a BLITE: Branch

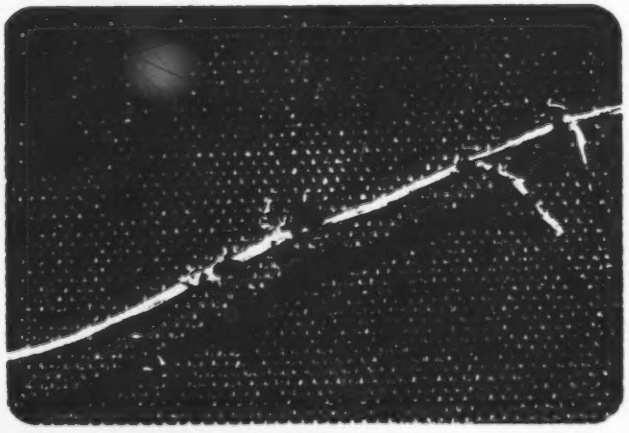
7. BLITE (Salt Bush)

Shown is a branch of a small, low-growing, drab-green bush called "blite." It overshadows levees and protects them against erosion. When it drizzles, the ground underneath this plant remains dry. Only heavy rains can penetrate its overlapping leaves. A red seed, seen at the top, is the next generation of this annual succulent.



Frame 21
#7b BLITE: Flower and Seed

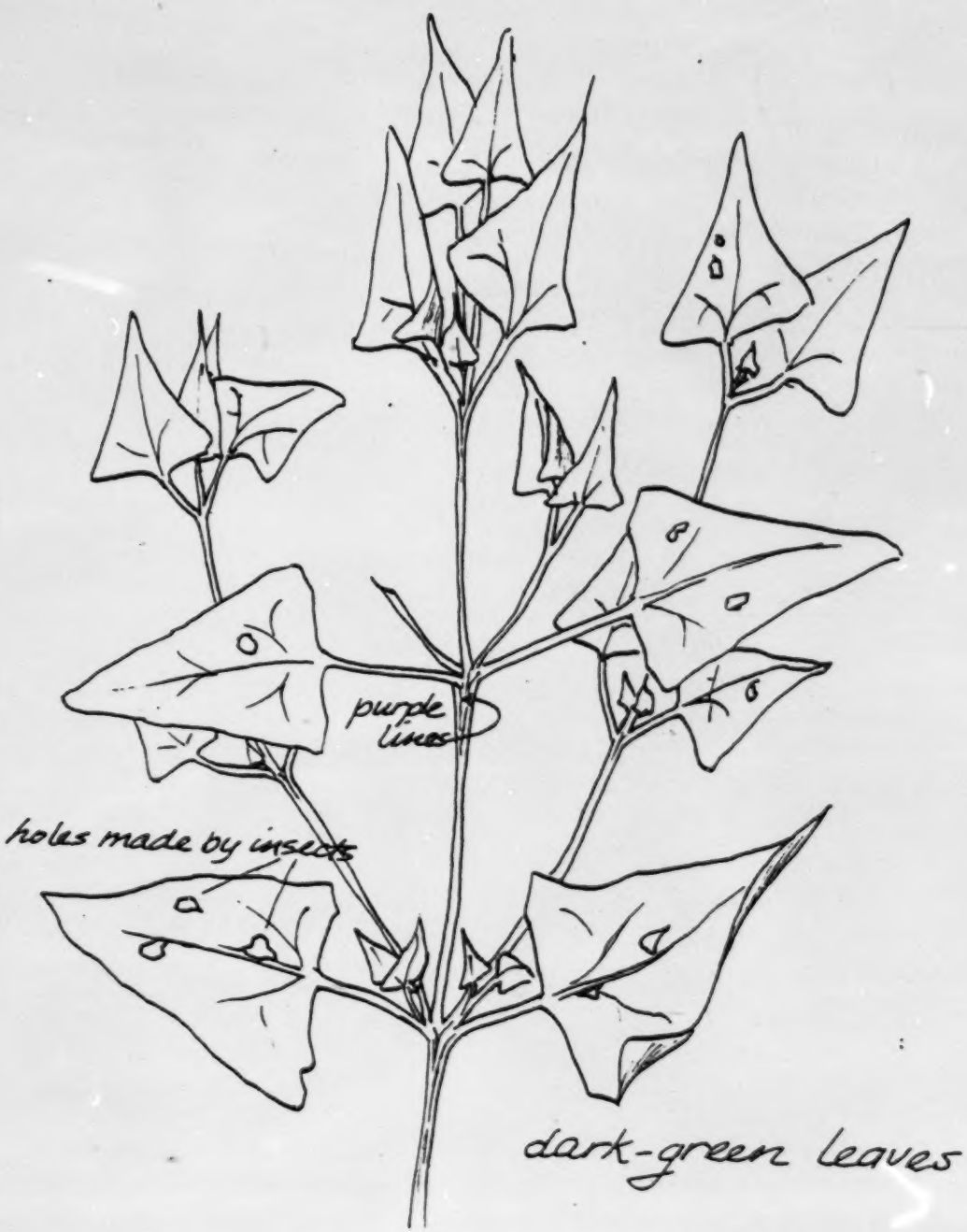
Flowers of blite appear from May to July, and the seed almost immediately follows. Here the seed is shown sliced open, almost transparent as it lies atop a penny for scale. The juicy middle illustrates its succulent character. Many seeds are provided by the adult shrub, yet good rains must be present for lush patches. Find the seed and cut one open. Examine a white seed embryo such as the one shown. A pocketful of these seeds would weigh perhaps an ounce.



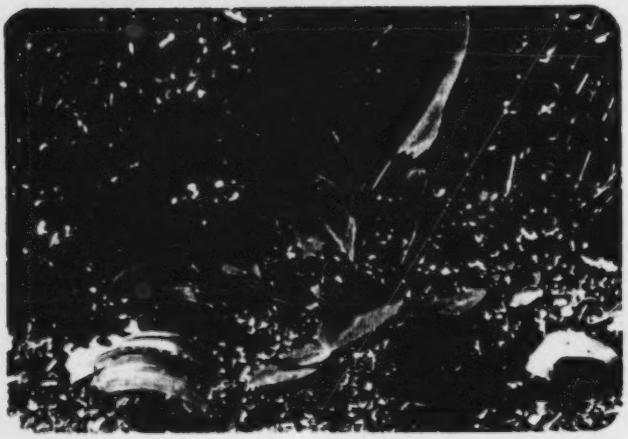
Frame 22
#7c BLITE: Twig and Seeds

Here is a blite twig. Notice its dry seeds. All ready for germination, they lie on a branch long since dehydrated. In winter many of these bushes look like dried sage brush. Collect a few twigs and open a seed pod to examine its contents. Slice open the stem and notice how dry it has become. Then compare a dry branch to a living one to determine how much more moisture living twigs contain!

Fat Hen



27



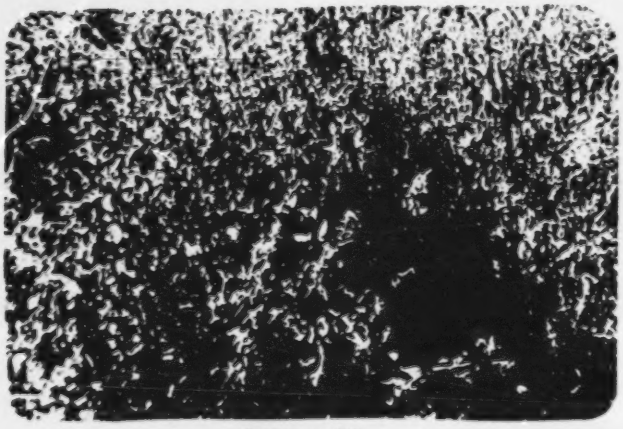
Frame 23
#8a FAT HEN: Site Location in Spring

8. FAT HEN *(Atriplex patula)*

Shown in its invasion of Haywards Landing (a former dump site, as evidenced by broken glass), fat hen emerges from the ground in spring months. Here it is about six inches high. The leaves are paper thin, and already possess the characteristic "arrow" shape. One of the annuals of the shoreline, it will experience a tremendous growth in its short life span.

Frame 24
#8b FAT HEN: Leaf and Flower

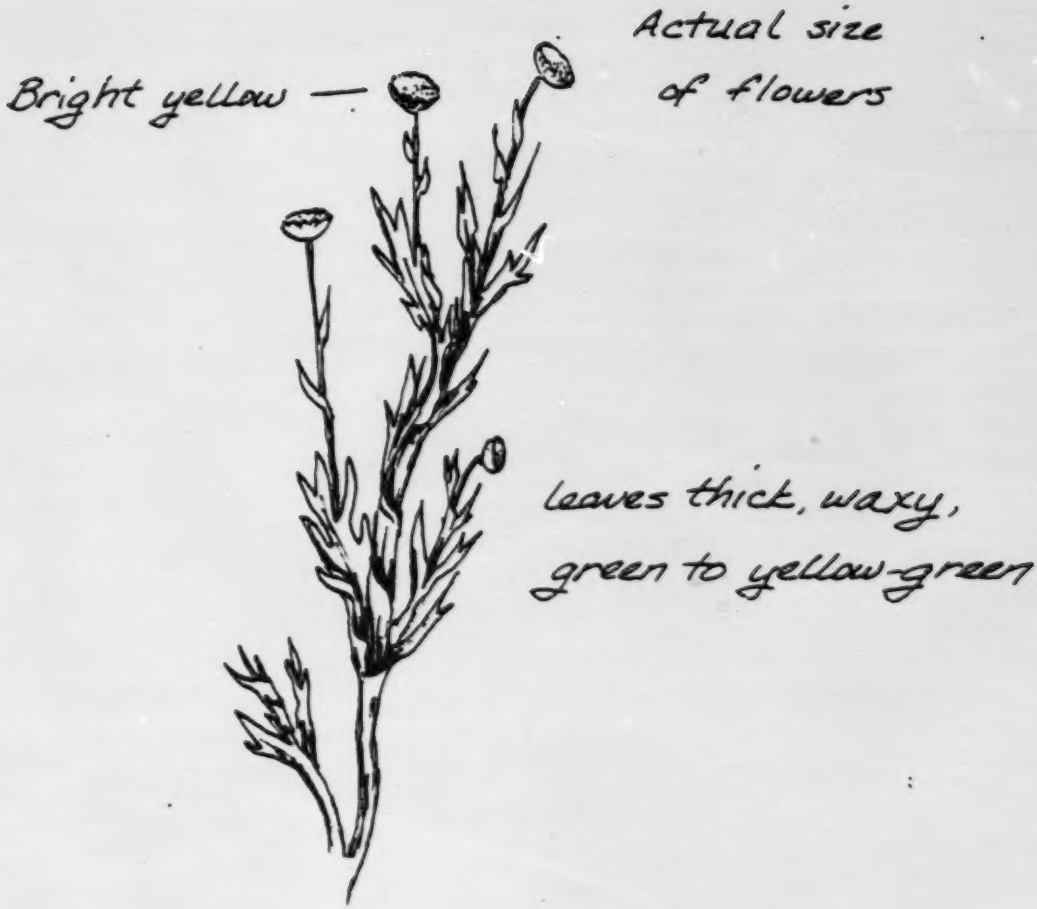
Shown is a leaf approximately two inches long. Already leaves have begun to thicken as the hot summer months begin. This thickening protects against moisture loss. Flowers are beginning to appear as green clusters of buds about the size of small beads. In the upper right corner is a cluster beginning to turn the characteristic purple color. Each flower will become a seed.



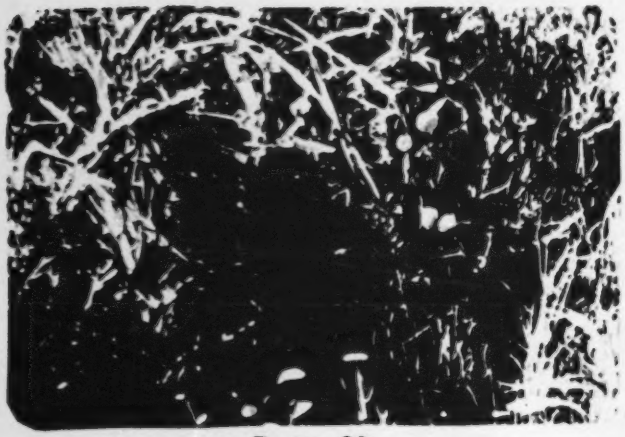
Frame 25
#8c FAT HEN: Site Location in Fall

Shown here is a dense mat of mature fat hen plants. Taken in late fall, the plants have turned a bright reddish color. As an annual, its flowers are seeds and have begun to drop to the ground to await the winter rains. Then, extreme high tides will wash away the dying plants whose roots will no longer be able to hold tight to their birthplace.

Brass Buttons



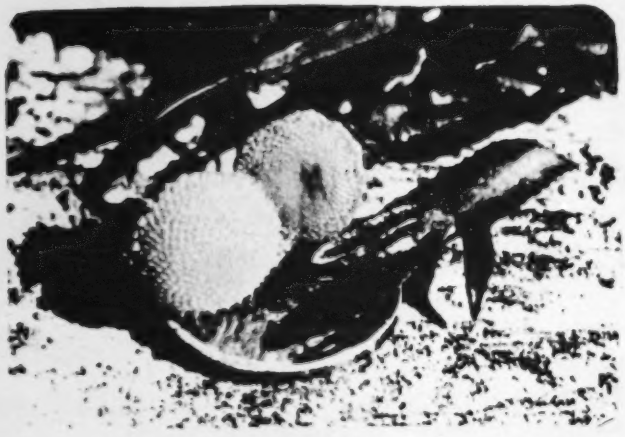
29



Frame 26
#9a BRASS BUTTONS: Site Location

9. BRASS BUTTONS
(Cotula coronopifolia)

Brass buttons is a succulent that adds color to the shoreline at all seasons. Able to withstand the hottest summer months, it flourishes where few plants can. It grows to approximately two feet and its leaves resemble those of the ice plant. Feel how smooth and slick the stem-like leaves are. Brass buttons is a native of Europe.



Frame 27
#9b BRASS BUTTONS: Flower

Shown next to a penny, the brass buttons flower looks like the center of a sunflower head. A tightly packed round flower, it leaves little surface area to allow evaporation. Also to control water loss, the flower and leaf are coated with what looks like plastic. Break off a stem and watch the juices bead. Pluck a flower and slice it open - examine the inside!

Frame 28
#10a NEW ZEALAND SPINACH: Site Location

10. NEW ZEALAND SPINACH
(Tetragonia expansa)

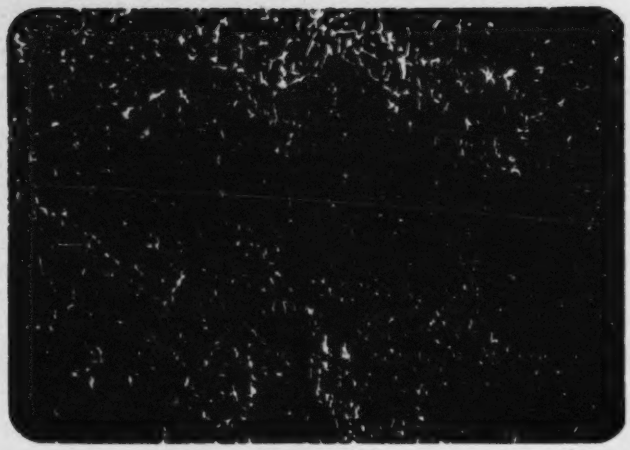
New Zealand spinach, a native of Asia and Australia (*not* New Zealand!), adds variety to the shoreline. Stored in its leaves are cells that hold ounces of moisture. Even though not a native to this area, it has adapted nicely. If you see one, look under its leaves to discover the creatures it harbors.

African Ice Plant
(crystallinum)

White flowers are silky

Tips and centers of buds are red

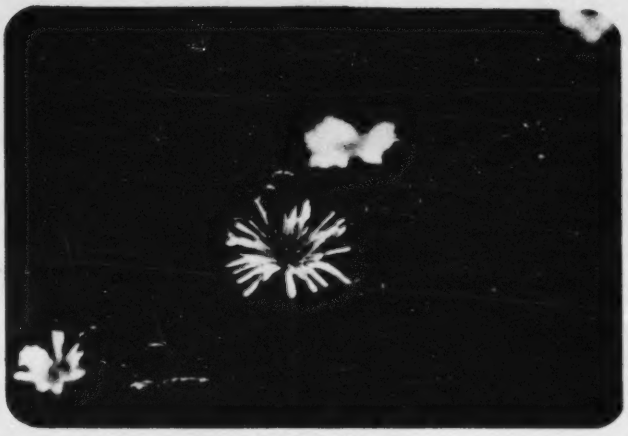
Leaves and stems covered with clear, jewel-like beads



Frame 29
#11a AFRICAN ICE PLANT: Site Location

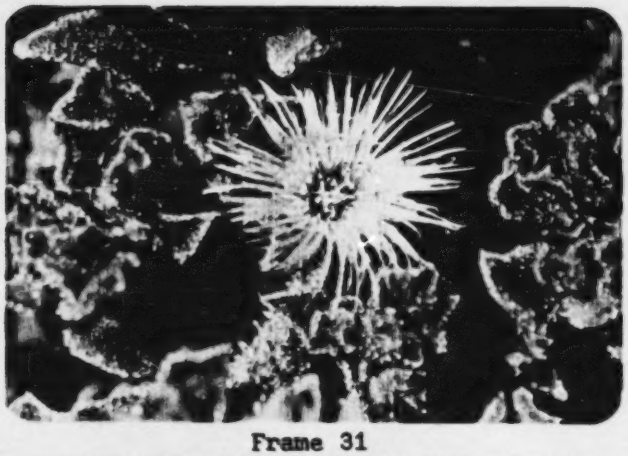
11. AFRICAN ICE PLANT
(Mesembryanthemum nodiflorum)

Notice a plant six inches tall, green and red as it completes its annual stage. This native of Africa has adapted quite nicely. Resembling a small ice plant that changes from a green to a red stage, it has spread along Haywards Landing. Be careful not to step on this introduction from another part of the world.



Frame 30
#11b AFRICAN ICE PLANT: Flower

The daisy-like African ice plant flower shown is just under an inch in diameter. Its very waxy petals and yellow center attract insects to pollinate and thus produce seed for next year's plants. Notice the leaf tips have begun to turn pink. It is characteristic of annuals to change color. Break a piece of the stem and notice how juicy it stays - a tightwad with its water!



Frame 31
#12a AFRICAN ICE PLANT - ANOTHER SPECIES: Flower

12. AFRICAN ICE PLANT
(Mesembryanthemum crystallinum)

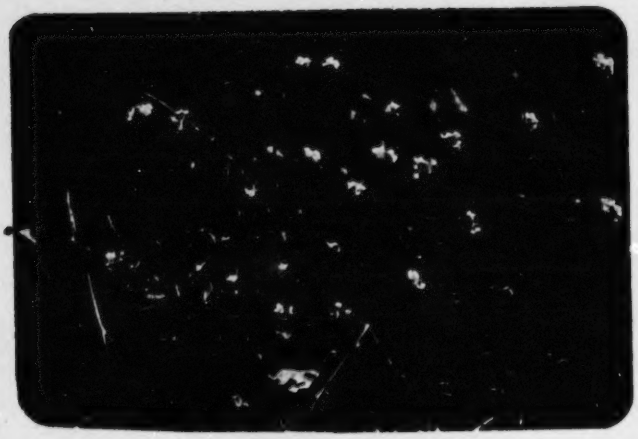
Shown flowering is another species of African ice plant. An an annual succulent, it retains its moisture in glistening masses on its leaves and stems. The white flower shown is about one inch in diameter, and blooms from March to October. Break off a small stem and notice the juices it stores!

Mustard

Tiny yellow flowers.
grow in clusters
at stem ends

leaves and stems
are rough

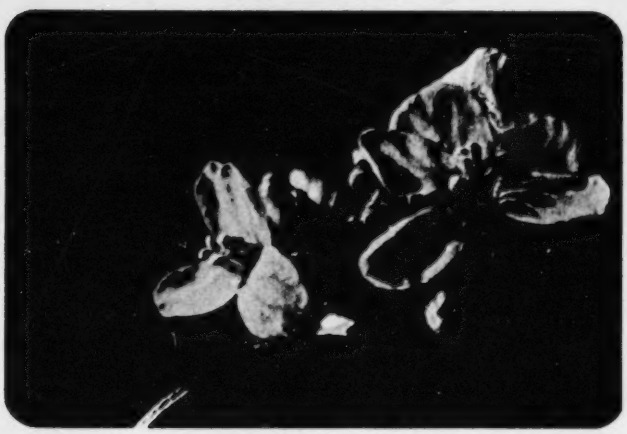
33



Frame 32
#13a MUSTARD: Site Location

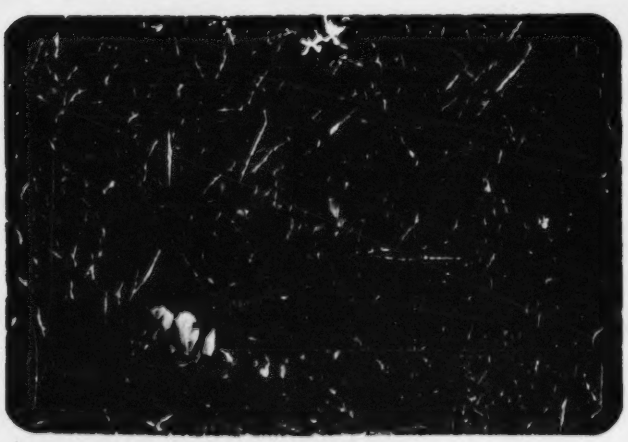
13. MUSTARD *(Brassica spp.)*

Shown is a common mustard plant approximately three feet in height. This native European plant was sowed by the early Spanish missionaries to mark their trail for future expeditions from Mexico to San Francisco Bay. Having spread ever since, mustard now grows all over the Bay Area. Its leaves are edible, either boiled like spinach or eaten raw in salads (young leaves are best!) Try one!



Frame 33
#13b MUSTARD: Flower

A yellow four-petal mustard flower is shown next to a penny for scale. Brightly colored petals attract insects that pollinate the flower. Soon the flower will ripen into a long green pod (not shown), which carries the black seed used commercially as "mustard seed." Notice the green buds in back that have not bloomed. Smell this plant's pungent mustard fragrance.



Frame 34
#14a RADISH: Site Location

14. RADISH *(Raphanus sativus)*

Shown is the radish plant, very similar to the size and shape and flower of the field mustard. Closely related to mustard, the radish has a "radish" odor. Its leaves are also edible. The plant shown is approximately two feet tall. See if you can distinguish a radish from a mustard plant. How many differences can you find?

34

Radish

35

Frame 35
#14b RADISH: Flower

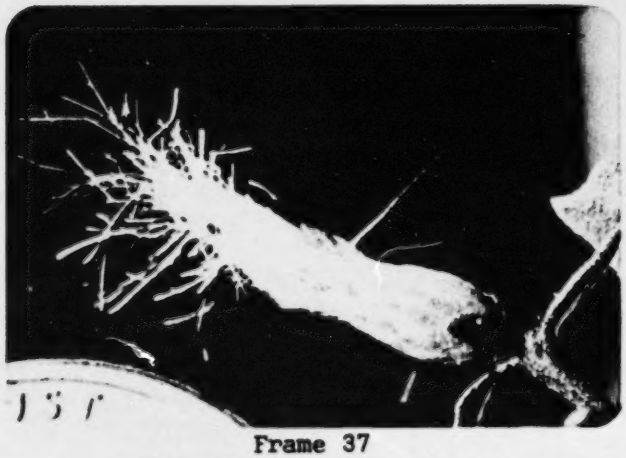
RADISH (continued)

A white four-petal radish flower and leaf are shown next to a penny for scale. The flower varies in color from white to lavender. The petals are longer than those of the mustard flower, and the ripened seed pod (not shown) is broader and shorter. If you find a pod, open it and count the seeds!

Frame 36
#15a COYOTE BUSH: Site Location

15. COYOTE BUSH *(Baccharis pilularis)*

This photo of a coyote bush was taken on the northern side of Turk Island. The sweet-scented bush is about 3 feet tall and resembles a tree with its woody-bark stems. Leaves are a dark green, about one inch long with a saw-toothed edge. The plant flowers in early fall. When you see a coyote bush, take time to smell its attractive fragrance!

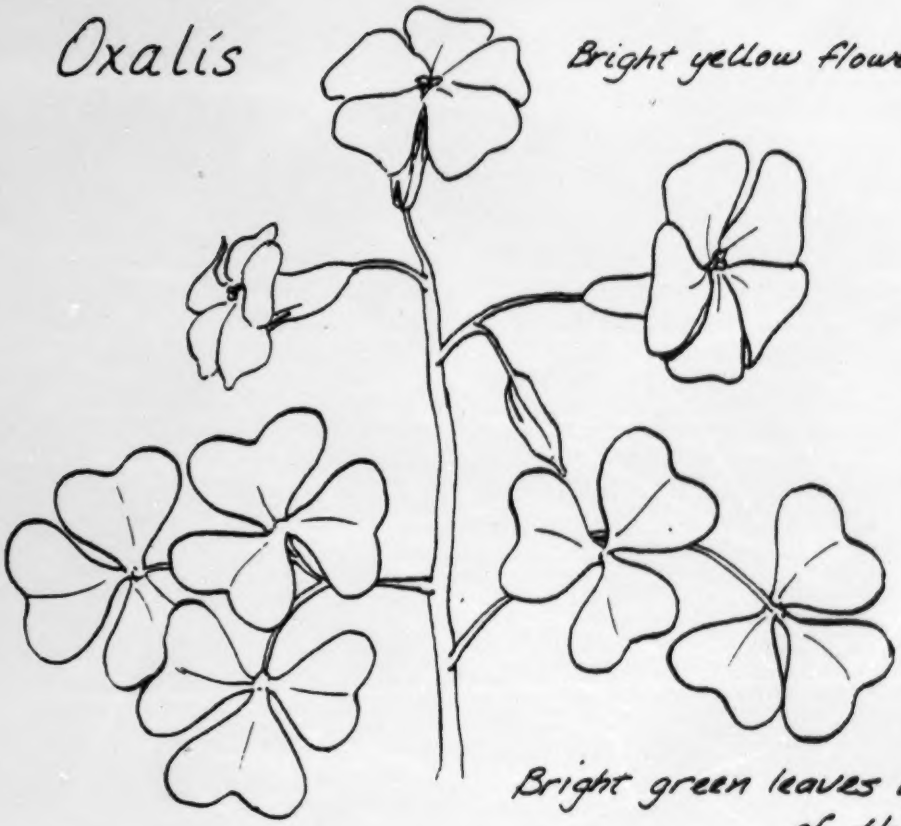


Frame 37
#15a COYOTE BUSH: Flower

Many seeds are contained in the vase-like white flowers of the coyote bush. When ripened, the flower will release into the wind scores of lighter-than-air, fairy-like seeds. See if you can find a ripened seed and blow it air-borne. Watch as it floats gently downward, or as a light breeze lifts it away.

36

Oxalis



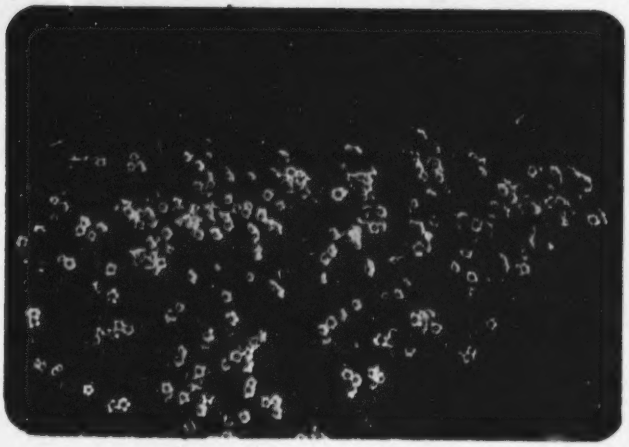
Bright yellow flowers, orange centers

Bright green leaves in groups of three

Sweet Alyssum

long narrow leaves

Clustered white flowers with yellow centers



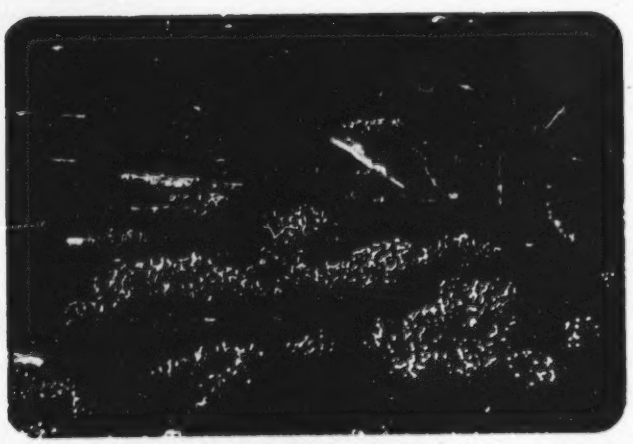
Frame 38
#16a OXALIS: Site Location

16. OXALIS *(Oxalis spp.)*

This attractive ground cover, oxalis, is also called "sour grass." Break off a stem and taste the sourness! Usually seen as a Bay Area roadside plant, it has invaded Haywards Landing and has begun to dominate the levees. During the spring months its color adds charm to the scenic shoreline.

Frame 39
#16b OXALIS: Flower

Shown is the oxalis' five-petal flower. Just moments after it was picked, while its picture was taken, it began to wilt. Unlike many other shoreline plants, oxalis is quickly dehydrated and will not survive the hot summer months. The flower has bright orange pollen in the center. This wildflower, recently introduced to the levees, will spread if left undisturbed.



Frame 40
#17a SWEET ALYSSUM: Site Location

17. SWEET ALYSSUM *(Lobularia maritima)*

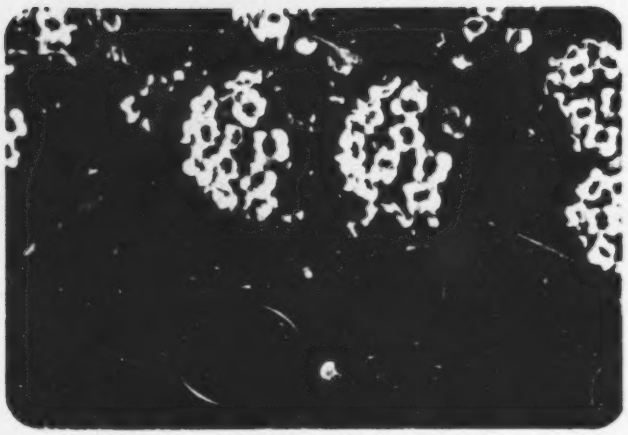
This is the common Bay Area roadside ground cover, sweet alyssum. It flourishes after winter rains and prevails through the spring months. From a distance these patches might be mistaken for a flowering clover. As you approach sweet alyssum, its "large blossoms" are seen to be flower clusters made up of many tiny individual flowers.

38

Thistle

Brilliant pink-purple flower
These spines hurt!
leaves are dark green

39



Frame 41
#17b SWEET ALYSSUM: Flower

SWEET ALYSSUM (continued)

Notice how tiny the sweet alyssum is next to a penny! A hand lends is very helpful for viewing this fragrant white-to-lavender flower. A small bouquet will scent even a large room. Stand downwind from a patch of sweet alyssum and you will be amazed at such a sweet fragrance along a bay-scented levee. A native of Europe, sweet alyssum was introduced by early settlers for its pleasant aroma.

Frame 42
#18a THISTLE: Site Location

18. THISTLE *(Cirsium coulteri)*

This thistle or "prickly plant" shown on the levee at Haywards Landing is approximately four months old and three feet tall. As it grows it will add stickery spines to its leaves. Then watch out or it will jab you if you brush against its thorny leaves! It is well protected from being vandalized, don't you agree? Thistle is a member of the artichoke family. Also seen is its purple flower, which blooms in April.

Frame 43
#18b THISTLE: Flower

Shown scaled next to a dime is the thistle's needle-like flower. The flower varies from a pink to a purple. The flower is an "artichoke" and if the prickles are removed and the flower boiled, it is edible. The purple flower is not spiny and attracts a host of colorful insects who do the pollination. Also shown are two flowers which are becoming seeds.

SIMPLIFIED KEY TO PLANTS OF THE SHORELINE

HOW TO USE A KEY

A plant or animal "key" is a tool used by scientists to identify a plant or animal if its name is not known. Just as the right latchkey unlocks a door, the right plant or animal key will give the scientist the information he seeks.

In all scientific plant keys, identification is made by flower structure. We have created, however, a key to the common shoreline plants which requires no knowledge of flower structure. Though simplified, it works like all keys and is fun to use. You become a detective who is hunting for clues in your efforts to "Find the Name."

STEPS TO FOLLOW

1. Study the unknown plant with care - look for flowers (size, color, shape); look at leaves.

2. Read from the top of the Key down until you reach a statement which is "true" of your unknown plant.

3. Look across the page for information on where to find the next clue.

4. Read the description in the next clue. If true, repeat Step #3. If <u>not</u> true, read down the page until you find another true statement, and <u>then</u> repeat Step #3.

5. At some point you will read a true statement and when looking across the page for more information you will find, instead, the name of your plant. Congratulations! You have "solved the case"!

KEY TO COMMON HAYWARD SHORELINE PLANTS

1a	Found free floating during high tides or laying on a wet mud flat during low tides	...2
1b	Found attached to ground, not free floating; flowers may or may not be present	...3
2a	Large, wide green semi-transparent leaf found in mudflat	Sea Lettuce (Zone 1)
2b	Long, thin green semi-transparent blade found in mudflat	Eel Grass (Zone 1)
2c	Red, stringy hair-like tentacles found floating in mudflat	Red Seaweed (Zone 1)
3a	Appears to be all stems and without leaves	...4
3b	Leaves are grass blades	...5
3c	Stems and leaves present; flowers may or may not be present	...6
4a	Appears like small pickles joined together; stem juice is salty; grows in dense mats	Pickleweed (Zone 2)
4b	Orange hair-like strands growing on 4a	Marsh Dodder (Zone 2)
4c	Stems are tiny (about ½" long) and finger-shaped; white flowers have numerous needle-like petals, yellow center; flowers ½" diameter	African Ice Plant* (Zone 3)
5a	Stands 1' to 4' high; plants resemble rice in paddies, has tassel like corn plant; found in mudflat zone	Cordgrass (Zone 1)
5b	Resembles bermuda grass; 6" to 1' high; found in drier zone	Salt Grass (Zone 2)
6a	Small (1" long or less) leaves	...7
6b	Larger (more than 1" long) leaves	...8
7a	Has ½" diameter purple flowers of five petals; leaves clustered and oval shape, ½" long by ¼" wide	Alkali Heath (Zone 2)
7b	Flowers appear as little red balls about ¼" and without petals; leaves covered with downy hairs, leaves about ½" long	Blite (Zone 2)
7c	Leaves resemble clover; bright yellow flower about 3/4" in diameter; stem has "sour grass" taste	Oxalis (Zone 3)

**Nodiflorum* variety

KEY TO PLANTS continued

7d	Tiny white flower; very sweet scent; about ¼" in diameter	Alyssum (Zone 3)
7e	Resembles sage brush; small (½" to 1" long) dark green leaves; small white flowers in vase-like pods (during bloom); plant has "sage" odor	Coyote Bush (Zone 3)
7f	Small yellow button-like flowers ½" in diameter; leaves thick, smooth, stem-like	Brass Buttons (Zone 2)
8a	Leaves (1" to 3") straight and pointed; 1" diameter bright yellow flower that resembles daisy; base of flower sticky like glue; adult plant about 3' high	Marsh Grindelia (Zone 2)
8b	Arrow-shaped dark green leaves (1" to 2") have purple tint; flowers resemble purple tinted beads at tip of branches; stems have purple lines running up and down	Fat Hen (Zone 2)
8c	Leaves broad (1" long and longer"' appears icy or prickley (pokes)	...9
9a	Low growing; thick leaves and stem are lt. green, covered with crystal-like water nodes; leaves 2-4" long may have red tips; flowers white, 1" diameter, soft needle-shaped petals	African Ice Plant** (Zone 3)
9b	Leaves 1-2" long, broad green, look like gelatin; flowers yellow-green	New Zealand Spinach (Zone 3)
9c	Leaves stickery to touch (hurts!)	...10
9d	Leaves not stickery to touch; leaves very long; flowers ½" in diameter and have four petals; plant has pungent odor	...11
10a	Leaves project needles, hurts to touch; 1" diameter pink-to-purple flower resembles clustered needles	Thistle (Zone 3)
10b	Leaves, stems and green vase-like base are stickery; five-petal bright orange flower is very tiny (about ¼" in diameter	Fiddleneck (Zone 3)
11a	Yellow flower, four petals; mustard odor and taste; plant about 1' to 5' high	Field Mustard (Zone 3)
11b	Flower white to pink to purple, four petals; radish odor and taste; plant about 1' to 5' high	Wild Radish (Zone 3)

**_Crystallinum_ variety

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